

EU-Projekt "Muta-Textile Dyes"



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Project summary

In the European research project "Identification and Substitution of Mutagenic Dyes in Textile Finishing (QLK4-CT-2000-70158)" textile dye products were examined for available (published and unpublished) genotoxicity data, mutagenicity tests were performed and mutagenic products were substituted. Nine textile companies (TCs) from 8 European countries and 4 research institutes participated in this project.

The project was carried out with the following steps:

- Identification of the most important dyes used in the different textile finishing companies. All dyes used in each company were listed and the corresponding amount used per year was linked.
- The available mutagenicity data from literature were summarized.
- In addition dye producers were asked for more information.
- Dyes were selected for testing during the project schedule.
- Ames tests were performed for dyes with insufficient data, as well as their respective textile products and waste water.
- MLA Tests were carried out with selected Ames positive dyes.
- Mutagenic products were substituted with non-mutagenic dyes or, where this was not possible, the colour was eliminated.
- Experience gained by the partners during these activities was summarized to formulate a generic substitution strategy.

In addition dissemination and exploitation strategies were discussed, and data on the legal background in the European textile industry and policy related benefits were summarized.

Overall 281 dye products were evaluated. Mutagenicity data were scarce in published literature or other publicly available sources (e.g. databases, authority reports) and in the safety data sheets, while data for 174 products could be provided by the dye producers. For a total of 98 products (35%) no mutagenicity data were available.

53 dye products not investigated for mutagenicity up to that point were selected for testing in the Ames test with *Salmonella typhimurium* following OECD 471. About 28% (15 out of 53) of the dye samples were positive in the Ames test (strains TA98 and/or TA100). Mutagenicity of 9 Ames positive textile dye products was further investigated in the Mouse Lymphoma Assay (MLA) (OECD 476). 67% (6 out of 9) products induced genotoxic effects in the MLA. The induction rates (IR) are from 2.1 to 132 in the Ames test and 2.1 to 15.2 in the MLA.

All data sources combined led to the following overall evaluation for the 281 textile dye products assessed (following figure):

- for 107 dye products (or dye components) base-level requirements are fulfilled and the results give no hint to mutagenic activity,
- for 73 products only one test is available with no indication of a mutagenic potential,
- for 16 products there is a positive test result in the only test existing or results from several tests led to contradictory results leaving suspicion of mutagenic activity,
- 14 dye products are assessed to have mutagenic activity,

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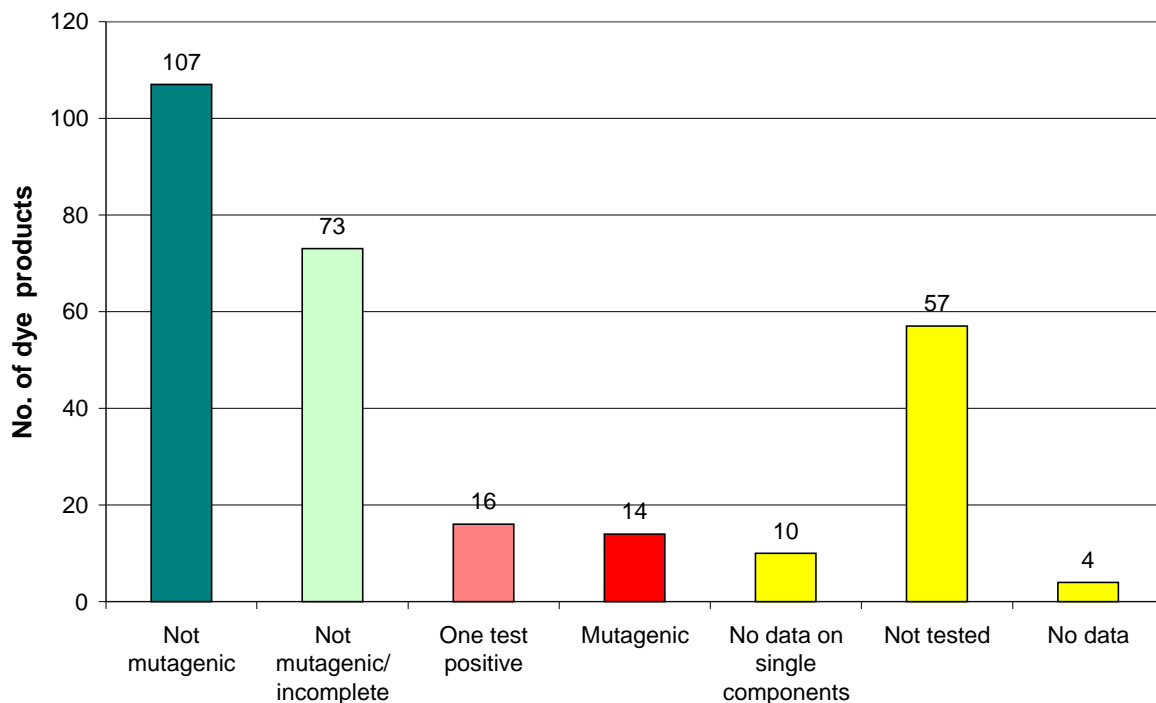
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- still, despite substantial laboratory testing efforts within this project, for 71 dye products currently used by the SME partners genotoxicity data are unknown or completely lacking.



Overall mutagenicity assessment for 281 textile dye products, based on published data, test results provided by dye producing companies and our own laboratory test results

To simplify communication and understanding during the substitution process the assessment of the dye products was further summarized in the three categories "**red**" (mutagenic), "**yellow**" (combines all categories with insufficient data for a final evaluation, i.e. the categories "not mutagenic/incomplete", "one test positive", "no data on single components", "not tested", and "no data") and "**green**" (sufficiently tested (base-level set of EU chemical legislation) and not mutagenic).

In addition more than 100 textiles and waste water samples were investigated in the Ames test to identify dyes which, although they are used in low amounts, are highly mutagenic in this test. Overall 7% of the textiles and 33% of the waste water samples were mutagenic. In two companies effects were traced, and dyes which were responsible for these effects could be identified.

All participating TFCs were able to substitute or eliminate dyes which were identified to be mutagenic. Experience has shown that depending on the placement of the dye to be substituted in the production process the amount of effort can be quite variable, but that substitution is in principle possible. With this experience a general substitution strategy was developed which could be adopted by the project partners.

The experience in the project led to the formulation of the following substitution strategy:

- 1) Companies should prepare a complete list with the names of currently used dyes.
- 2) All safety data sheets for these dyes must be analysed.

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- 3) A literature survey to find all scientific data available can be performed.
- 4) A questionnaire must be sent to the corresponding dye producers for additional data.
- 5) Dyes must be classified into categories as "red", "yellow" or "green".
- 6) "Red" category products must be substituted or eliminated.
- 7) Dye producers will be asked for technically suitable products that are not mutagenic.
- 8) These alternatives must be tested on a laboratory scale in the TFCs and subsequently on a technical scale in the dye house.
- 9) Producers can be asked for additional tests to evaluate dye products in the "yellow" category.
- 10) "Yellow" products must be re-evaluated (e.g. with additional tests) as "green" or also be substituted.

The participating European companies are now able to use these results to increase their competitive standing. It is desirable that other textile companies in Europe also adopt the developed substitution strategy. The result would be a significant improvement of the safety of the workers and consumers. By increasing the quality of textiles made in Europe a beneficial effect is expected for the European textile industry, which is under heavy pressure by cheap and low-quality textile imports.

Dissemination and marketing strategies were discussed at several meetings and workshops. Envisioned marketing strategies for the obtained results comprise

- company-specific end-consumer advertising,
- information of ready-made clothing manufacturers and big retailers (customers of the textile finishing SMEs)
- company certification of the participation and achieved results
- creation of a label for a mutagen free textile dyeing process either on textile products or on production processes.

Dissemination activities are seen to be of utmost importance for achieving economic benefits and include scientific publications, workshop and conference contributions, and direct information of various players within the textile chain: textile finishing industry, manufacturers and retailers, consumers.

The results are transferable to the European leather industry and to the manufacture of stuffed toy animals and other textile products and will also help to meet the criteria of the European "EU White Paper on Strategy for a future Chemicals Policy".